Plate heat Exchanger

Observation

1	Width of plate	0.125	m
2	Height of plate	0.55	m
3	Thickness of plate	0.000001	m
4	Thermal conductivity	15.1	W/m.K
5	pi	3.141592654	

Observation Table

Hot Fluid			Cold Fluid		
Flow rate (lpm)	Inlet Temp (°C)	Outlet Temp (°C)	Flow rate (lpm)	Inlet Temp (°C)	Outlet Temp (°C)
5	52	51.5	5	31	39.7
5	52	51.2	7.5	30.7	38
5	52	50.6	10	30.9	36.5
5	52	50.2	12.5	30.8	35.7

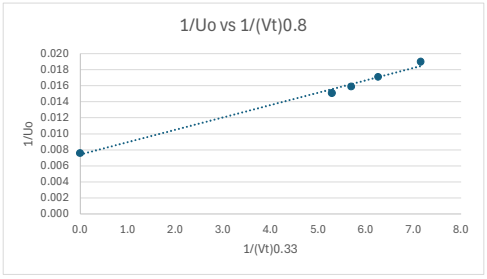
Calculation

Equivalent Diameter	0.203703704	m
Axial flow area	0.032590253	m²

		1		2		3		4		
		Hot Fluid	Cold Fluid	Hot Fluid	Cold Fluid	Hot Fluid	Cold Fluid	Hot Fluid	Cold Fluid	
1	Tavg	51.75	35.35	51.6	34.35	51.3	33.7	51.1	33.25	°C
	ΔT	0.8	-8.7	0.8	-7.3	1.4	-5.6	1.8	-4.9	°C
	Properties of water									
2	Density	987.231	993.9126	987.3012	994.2493	987.4416	994.4586	987.5352	994.6035	Kg/m³
3	Dynamic viscosity(μ)	0.00053195	0.00071438	0.00053324	0.00072914	0.00053582	0.00073928	0.00053754	0.0007463	Kg/m.sec
4	Kinematic viscosity	5.383E-07	7.1938E-07	5.3956E-07	7.3401E-07	5.4208E-07	7.4402E-07	5.4376E-07	7.5095E-07	m²/sec
5	Specific heat capacity(Cp)	4180.35	4179	4180.32	4179.13	4180.26	4179.26	4180.22	4179.35	J/Kg.K
6	Thermal Conductivity(K)	0.64575	0.62356	0.6456	0.62209	0.6453	0.62118	0.6451	0.62055	W/m.k
7	Mass flow rate(m)	0.08333333	0.083333333	0.083333333	0.125	0.083333333	0.166666667	0.083333333	0.208333333	Kg/sec
8	Rate of heat transfer(Q)	278.69	-3029.775	278.688	-3813.456125	487.697	-3900.642667	627.033	-4266.419792	W
9	Mass Velocity(G)	2.55700173	2.55700173	2.55700173	3.835502596	2.55700173	5.114003461	2.55700173	6.392504326	Kg/m².sec
10	Average velocity(Vt)	0.00259007	0.002572663	0.00258989	0.003857687	0.002589522	0.0051425	0.002589277	0.006427189	m/sec
11	Reynolds number(Nre)	979.172334	729.1227678	976.803546	1071.544675	972.1001882	1409.129756	968.9896991	1744.843638	
12	Prandtl number(Npr)	3.4436503	4.787661203	3.452778558	4.898279748	3.47104744	4.973829378	3.483235869	5.026265257	
13	Heat transfer coefficient (hcal)	102.418613	105.4140175	102.3149653	136.3099823	102.1086	163.6297558	101.971706	188.6109923	W/m².°C
14	1/(Vt)^0.33	7.13849996	7.15440741	7.138667467	6.259102941	7.139002454	5.692623716	7.139225761	5.288750195	sec/m
15	Overall heat transfer coefficient(1/Uo)	0.019250321		0.017110027		0.015904919		0.015108626		m² .°C/W
16	Uo	51.94718595		58.4452601		62.87363245		66.18735548		W/m².°C

GRAPH :

1/Uo	1/Vt0.33
7.2	0.019
6.3	0.017
5.7	0.016
5.3	0.015



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